IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant: ROTKOPF, Menahem	§	
Serial No.: 09/700,666	§	
Filed: November 17, 2000	§	Group Art Unit: 3641
For: An Armor Piercing Projectile	§	Attorney Docket: 26/370
Examiner: Troy Chamber	§	

Commissioner of Patents and Trademarks
Washington, D.C. 20231
ATTENTION: Board of Patent Appeals and Interferences

APPELLANT'S BRIEF

Dear Sir:

This is in furtherance of the Notice of Appeal filed in this case on December 12, 2002.

The fees required under § 1.17(c) and any required petition for extension of time for filing this brief and fees therefor are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief is transmitted in triplicate.

This brief contains these items under the following headings and in the order set forth below:

I. REAL PARTY IN INTEREST
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I. REAL PARTY IN INTEREST

The real party in interest in this case is:

State of Israel – Ministry of Defense
RAFAEL – Armament Development Authority
P.O.B. 2250
Haifa 31021
Israel

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences in this case.

III. STATUS OF CLAIMS

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

Claims in the application are: 1-11 and 14-18

B. STATUS OF ALL THE CLAIMS

1. Claims cancelled: none
2. Claims withdrawn from consideration but not cancelled: none
3. Claims pending: 1-11 and 14-18
4. Claims allowed: none
5. Claims rejected: 1-11 and 14-18

C. CLAIMS ON APPEAL

The claims on appeal are: 1-11 and 14-18

IV. STATUS OF AMENDMENTS

In response to the final rejection, no claims were amended.

V. SUMMARY OF INVENTION

The present invention relates to a projectile for piercing armor having a first motor for maintaining a substantially constant cruise velocity of the projectile and an acceleration rocket motor activated for accelerating the projectile from the cruise velocity to a penetration velocity in a final stage of flight of the projectile wherein the projectile is adapted to be shot from a barrel. The present invention also relates to a method of piercing armor substantially using, for example, the projectile of the present invention.

VI. ISSUES

The issues presented for review are as follows:

a) Are claims 1-4, 14-18 anticipated by Schricker (WO 90/00244) ?

b) Are claims 5-7 patentable over Schricker in view of Luttrell (U.S. 3,903,804) ?

c) Are claims 9-11 patentable over Schricker in view of Luttrell and Jacobson (U.S. 4,127,243) ?

VII. GROUPING OF CLAIMS

For purposes of both the §102(b) and §103(a) rejections, independent claims 1 and 14 and claims dependent therefrom 2-11,17,18 and 15-16, respectively are grouped together and will stand or fall together.

VIII. ARGUMENTS

REJECTIONS UNDER 35 U.S.C. 102

The Examiner has finally rejected claims 1-4 and 14-18 under 35 U.S.C. 102(b) as being anticipated by Schricker. The Examiner's rejection is respectfully traversed.

Schricker teaches an anti-armor weapon launched from a launch tube, characterized in having a non-explosive kinetic penetrator. The penetrator is accelerated towards a target at a terminal stage of flight by a *boost propulsion device* after being launched from a launch tube using a *launch propulsion device*.

In order for claims 1 and 14 to be anticipated by Schricker, all limitations in the claims must be taught by Shricker. This is not the case:

a. Claim 1 limits that "*...the projectile is adapted to be shot from a barrel...*". Claim 14 includes "*...bringing said projectile to said cruise velocity by a process including shooting said projectile from a barrel...*". Schricker does not teach of shooting from a barrel but rather of launching from a launch tube.

b. Claims 1 and 14 include "*...a first motor for maintaining a cruise velocity...*". Schricker describes neither a cruise velocity nor a first motor.

a. The present invention as described in claims 1 and 14 is directed to a barrel-launched projectile. In stark contrast, Schricker teaches of a shoulder-fired weapon (*inter alia*, page 6 lines 21-24 and Figure 1). Unlike claim 1 of the present invention, where "*...the projectile is adapted to be shot from a barrel...*" Schricker teaches of a weapon adapted to be launched from a launch tube (*inter alia*, page 6 lines 21-24 and Figure 2). One skilled in the art would not confuse the term barrel limiting claims 1 and 14 with a launch tube as described by Schricker.

b. Claims 1 and 14 include "*...a first motor for maintaining a cruise velocity...*". Schricker describes neither a cruise velocity nor a first motor.

The purpose of Schricker is to provide a foot soldier with a portable anti-armor weapon. Thus, Schricker teaches an anti-armor weapon fired from a shoulder-held launch tube (page 2, lines 5-7). In a first step of use, the projectile is launched from a launch tube, bringing the projectile from static to a subsonic initial velocity (page 2, lines 18-19, page 4, lines 24-25). This is done using a *launch propulsion device* (page 2 line 12). Schricker is silent as to the nature of the *launch propulsion device* except by noting that it is preferably a rocket motor as used in a "Viper" (page 5 lines 19-24).

Such a rocket motor that continuously accelerates the projectile of Schricker cannot be read on the first motor of the present invention that **maintains** a "cruise velocity". Further, Schricker does not contemplate a "cruise velocity" to be maintained due to the entirely different nature of his teachings and of those of the present invention, *vide infra.*

One skilled in the art recognizes that there exist recoilless shoulder launched weapons (*e.g.* AT4 CS produced by Saab Bofors Dynamic AB) including a *launch propulsion device* comprising an explosive charge that propels a projectile from a launch tube using the "Lewis Gun" principle. A projectile of Schricker using such a *launch propulsion device* has no first motor to maintain a cruise velocity and rather loses velocity throughout a ballistic flight.

The importance of maintaining a cruise velocity using the first motor of the present invention is to reduce side-wind dependent scatter and to prevent "into the wind" torque. This issue has been thoroughly discussed in the Applicant's letter of July 4, 2002 and is summarized here.

Schricker teaches a *boost propulsion device* attached to a kinetic penetrator warhead. Once the warhead is in the proximity of an armored target, the *booster propulsion device* is activated to accelerate the warhead to a high velocity, increasing armor-piercing capacity. Schrecker also teaches a *launch propulsion device* to launch the projectile from a launch tube, either by continuous acceleration or by a single acceleration event followed by ballistic flight.

Schrecker does not teach of a "cruise motor" which maintains some initial cruise velocity in order to avoid scattering caused by cross winds (*vide infra*) or of a cruise velocity *per se*, a critical and integral part of the present invention as noted in claims 1 and 14.

A prior art warhead, for example the kinetic penetrator of an improved APDS shell, exits a cannon barrel at high velocities, in the order of up to 2000 m/sec and continues to the target in a ballistic flight. Due to air resistance, the kinetic penetrator impacts the target at a significantly lower velocity reducing armor-piercing capacity. As is clear to one skilled in the art, the further the kinetic penetrator travels the lower the armor-piercing capacity. Due to the small diameter of the kinetic penetrator, the effect of side-winds is minimal, causing a scatter of in the order of 1 meter for a 4 km flight.

It is unlikely that one would be motivated apply the teachings of Schricker, directed to a man-portable short-range tube-launched device, to a prior art barrel fired warhead. Assuming that this were to be done, the hypothetical warhead, upon reaching a target, would be accelerated to a high velocity and thus have an increased armor-piercing capacity independent of range. However, the addition of a *boost propulsion device* according to Schricker necessarily increases the physical size of the hypothetical warhead. The magnitude of velocity loss during ballistic flight would be increased, necessitating a greater barrel elevation for any given range and the concomitant difficulties in hitting a target. Further, the lower flight velocity coupled

with the larger cross section makes such a hypothetical warhead susceptible to cross winds. It can be estimated that such a hypothetical warhead would have a side-wind dependent scatter in the order of tens of meters for a 4 km flight. It is clear to one skilled in the art that a barrel launched projectile according to the teachings of Schricker is practically useless.

In contrast, the innovative addition of a first motor for maintaining a substantially constant cruise velocity of a projectile of the present invention (the driving force approximately equals drag) and an acceleration rocket motor for accelerating the projectile from the cruise velocity to a penetration velocity as described, *inter alia*, in claim 1 of the instant application overcomes these problems. The cruise motor is activated after the projectile exits the barrel. The cruise motor substantially maintains a constant cruise velocity, reducing the effects of side winds and allows for a flat "ballistic" trajectory, despite the larger size of the projectile.

It is important to note that it is also important that a cruise motor of the present invention not allow any substantial warhead acceleration, as occurs with the *launch propulsion device* of Schricker in a rocket embodiment. As is clear to one skilled in the art, acceleration of a projectile into a side-wind leads to "into the wind" torque that causes very high levels of scatter. This can be exceptionally problematic in areas where updrafts and downdrafts change the elevation of flight and the consequent range of a projectile.

In contrast, for the hand-held low-velocity short-range device of Schreker, issues such as side-wind dependent scatter and "into the wind" torque are of minor importance. Therefore Schreker does not address these issues. Schrecker apparently recognized the problem of "into the wind" torque caused by extreme acceleration on page 6 lines 11-14 by emphasizing that the terminal acceleration occurs only in the last 2 to 3 meters of flight (page 5 line 26).

In conclusion, not all features of independent claims 1 and 14 are taught by Schricker. Therefore, Applicant believes that the independent claims 1 and 14, and consequently all claims dependent thereform, are not anticipated by Schricker.

One may mistakenly allege that the present invention as described in claims 1 and 14 is obvious in light of Schricker and therefore not patentable. Applicant believes that from the discussion presented hereinabove it is clear that a person looking for guidance in overcoming the problems solved by the present invention would not study Schricker. Even if Schricker were studied, it is clear that by remaining silent about a cruise velocity and methods to maintain the cruise velocity, Schricker teaches away from the present invention.

REJECTIONS UNDER 35 U.S.C. 103

35 U.S.C. 103(a) Rejections – Schricker in light of Luttrell

The Examiner has finally rejected claims 5-7 under 35 U.S.C. 103(a) as being unpatentable over Schricker in view of US 3,903,804 (Luttrell). The Examiner's rejection is respectfully appealed.

Claims 5-7 are dependent from claim 1. As discussed hereinabove, claim 1 is in condition for allowance. As a result claims 5-7 are in condition for allowance.

That said, Schricker teaches an anti-armor weapon launched from a launch tube, failing to teach a barrel launched projectile with a cruise velocity.

Luttrell teaches a device for the dispersal of inert subprojectiles from a larger rocket-propelled warhead, an improved "flechette" or "canister" warhead.

Neither Schricker nor Luttrell encounter or mention the problems associated with side-wind dependent scatter or "into the wind" torque addressed by the present invention. These prior art do not provide solutions for these problems solved by the present invention, nor would one skilled in the art study these prior art in an effort to find such a solution.

Claims 5-7 describe features of the present invention for the neutralization of reactive armor. In the art it is known that to neutralize reactive armor, the reactive armor must be activated long enough before arrival or impact of the main destruction warhead so that the reactive armor has no effect on the main destruction warhead. The subprojectiles of Luttrell are mounted on a rocket and are released from the rocket at some point in flight when a maximal acceleration is reached, but are not accelerated further. A device combining a main destruction warhead with the subprojectiles of Lutrell is only incidentally effective in neutralizing active armor as the main destruction warhead and the subprojectiles arrive at the armor at virtually the same time. Therefore, it is not clear what the use of combining the teachings of Luttrell with Schricker would be and what bearing such a hypothetical weapon has on claims 5-7.

In conclusion, not all features of claims 5-7 are anticipated by Schricker in light of Luttrell. Even if obvious to combine the teachings of Schricker with those of Luttrell, the combined teachings do not relate to claims 5-7. Therefore, Applicant maintains that claims 5-7 are patentable.

35 U.S.C. 103(a) Rejections – Schricker in light of Luttrell and Jacobson

The Examiner has finally rejected claims 9-11 under 35 U.S.C. 103(a) as being unpatentable over Schricker and Luttrell further in view of US 4,127,243 (Jacobson). The Examiner's rejection is respectfully appealed.

Claims 9-11 are dependent from claim 1. As discussed hereinabove, claim 1 is in condition for allowance. As a result claims 9-11 are in condition for allowance.

That said, Schricker teaches an anti armor weapon launched from a launch tube, failing to teach a barrel launched projectile with a cruise velocity.

Luttrell teaches a device for the dispersal of inert subprojectiles from a larger rocket-propelled warhead, an improved "flechette" or "canister" warhead.

Jacobson teaches an electronic device for providing a missile with evasive maneuvering capabilities.

Not Schricker, not Luttrell nor Jacobson encounter or mention the problems associated with side-wind dependent scatter or "into the wind" torque addressed by the present invention. These prior art do not provide solutions for these problems solved by the present invention, nor would one skilled in the art study these prior art in an effort to find such a solution.

In conclusion, not all features of claims 9-11 are anticipated by Schricker in. light of Luttrell and in light of Jacobson. Even if obvious to combine the teachings of Schricker with those of Luttrell and of Jacobson, the combined teachings do not relate to claims 9-11. Therefore, Applicant maintains that claims 9-11 are patentable.

Respectfully submitted,

Mark M. Friedman
Attorney for Applicant
Registration No. 33,883

Date: December 18, 2002

IX. APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

The text of the claims on appeal is:

1. A projectile for piercing armor comprising:

a) a first motor for maintaining a cruise velocity of the projectile; and

b) an acceleration rocket motor activated for accelerating the projectile from said cruise velocity to a penetration velocity, in a final stage of flight of the projectile

wherein the projectile is adapted to be shot from a barrel.

2. The projectile of claim 1, wherein said projectile is a shell.

3. The projectile of claim 1, wherein said projectile is a missile

4. The projectile of claim 1, further comprising an armor-piercing rod situated within the projectile for piercing armor.

5. The projectile of claim 4, for further comprising a device coupled to the projectile for penetrating a reactive target having reactive armor.

6. The projectile according to claim 5, wherein said device includes an advance projectile associated with the projectile, for neutralizing reactive armor of a target.

7. The projectile according to claim 6, wherein said advanced projectile is a bullet.

8. The projectile according to claim 7, further comprising an electronic system to alter trajectory of the projectile during flight of the projectile.

9. The projectile according to claim 8, wherein said electronic system further comprises:

(a) a sensor, for detecting a target; and

(b) a guidance system, for controlling trajectory of the projectile.

10. The projectile according to claim 9, wherein said sensor is responsive to a radar signal.

11. The projectile according to claim 10, wherein said sensor is responsive to radiation emission of said target.

14. A method for piercing armor of a target, the method comprising the steps of:

a) providing-an armor piercing projectile-including:

i. a first motor for maintaining a cruise velocity of said projectile; and

ii. an acceleration rocket motor activated for accelerating said projectile from said cruise velocity to a penetration velocity in a final stage of flight of said projectile;

b) bringing said projectile to said cruise velocity by a process including shooting said projectile from a barrel;

c) maintaining said projectile at said cruise velocity;

d) increasing said velocity of said projectile to a penetrating velocity; and

e) impacting the target with said projectile at said penetrating velocity.

15. The method of claim 14, further comprising the step of:

(f) penetrating armor of the target substantially subsequently to step (e).

16. The method of claim 15, further comprising the step of:

(g) neutralizing reactive armor of said target prior to step (e)

17. The projectile of claim 1 wherein said first motor is a rocket motor.

18. The projectile of claim 1 wherein said first motor is activated substantially at the beginning of flight of the projectile.